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tracings almost as uniform as those of a tuning-fork, (for methods of registration, the original should be consulted). The average rate for the first second was 15-16, never more than 17; in a few persons of more than fifty years, less than 14½. In the same person it was constant, varying for Ewald himself only about half a vibration from the average. It could not be voluntarily changed, was not influenced by practice, and did not depend on the inertia of the head. The vibrations could not be kept up longer than 5-7 seconds, and grew slightly slower after the first second. They differ from tremors in regularity and constancy and in ceasing immediately when the head is fixed, which the fatigue tremor of the same muscles does not do. The author's explanation is that, by the contraction of one muscle and the accompanying movement, its antagonist is stretched, and the stretching makes it more excitable either directly, or reflexly as alleged for the knee-jerk. In trying to get tracings from the somewhat similar motions of the jaw when the teeth chatter, he failed because the attempt always inhibited the motions.

*Ricerche di psicologia sperimentale.* Prof. G. SERGI. Reprint from the *Rivista sperim. di Freniat.*, Vol. XII, fasc. 4, 1886.

Professor Sergi here insists on an objection made by him to Wundt's conception of the central stages (perception, apperception and volition) in simple reaction-times, believing that under the usual circumstances of experiment the processes are not separable. The criticism does not, however, hold with full force against Wundt's present views, published since the appearance of Sergi's article; for in the last edition of his psychology he gives very great prominence to a shortened form of reaction in which the central processes enter but partially or not at all, and, like Sergi, speaks of it as purely reflex. Wundt's pupils have found this form of reaction with light, sound and electrical stimulation. Sergi reports it for sound only, but gives smaller values to it, and finds it under circumstances not admitted by Wundt. With his best subject he gets the following reaction-times:

	Uncorrected mean. s.	Corrected mean. s.	Maximum. s.	Minimum. s.
With signal,	0.070	0.0644	0.093	0.047
Without signal,	0.0577	0.0492	0.0655	0.034
“ “	0.0725	0.067	0.0765	0.059
Barely perceptible sound,	0.0744	0.0688	0.083	0.054

In making the corrected means in the first and third series a single reaction from each was alone excluded; the maxima and minima seem to be for the corrected series. The values given by other experimenters for sound reactions range from 0.11 to 0.18.

Sergi also reaches results flatly contradicting two most widely accepted generalizations of psychometry, namely, that reaction-times with a premonitory signal are a good deal shorter than those without, and that reactions to strong stimuli are quicker than those to faint ones. In the table above there is no evidence of either. With other normal subjects he got for reactions without signal, series that ranged from 0.07 to 0.11, all as low or lower than those usually found with a signal; and with the faint sound, on the only other subject reported, he got an uncorrected mean of 0.097. The stimulus was a

bell stroke, and the time was taken with the chronoscope. The explanation of these results requires no more than an extension, to those cases where there are no aids to concentration, of the idea that concentrated attention can voluntarily set up a brain-reflex; and Sergi seems to have been the first to suggest that idea. His results stand, however, so directly in opposition to previous results that skepticism is natural. It may be asked, for example, whether the starting of the chronoscope itself did not act as a signal; and some chronographs also run slower for as much as three-quarters of a second after the throwing in of the hands (see C. S. Peirce, U. S. Coast Survey Reports for 1870, Appendix 21, p. 212). The subject is one worth further investigation. Wundt strangely seems not to have known of this paper when preparing the new edition of his psychology. E. C. S.

*Recherches expérimentales sur la durée des actes psychiques les plus simples et sur la vitesse des courants nerveux à l'état normal et à l'état pathologique.* A. RÉMOND. Paris: Octave Doin. 1888, pp. 135.

The author of this thick pamphlet has made 30,000 observations in all, on students, soldiers, old people, hemiplegics, and those suffering from myelitis, general paresis, epilepsy, hallucinations, delusions, hysteria, and muscular atrophy. He has plenty of "results" too, but unfortunately not of the decisive and convincing kind that might be hoped. The apparatus used was poor; the chronoscope (*chronomètre de d'Arsonval*) must have been far inferior to the Hipp instrument, and the other arrangements, if fully described, were not up to modern requirements. The tables, though numerous, show only the maxima, minima and averages of the series, and not the average variations. The stimulus was tactile; a certain portion of the hand, shoulder, ankle and hip were touched with a ball, a conical point and a needle. Discrimination-times were measured by using the ball and point in irregular order and requiring reaction to only one. The general conclusions reached are given for what they are worth. (1) The approximate speed of transmission in the sensory nerves in normal subjects is about 34.72 m. per sec. in the legs and 27.02 m. in the arms (determined by Schelske's method, *i. e.* by comparing reaction times for stimulated points unequally distant from the brain). The rate seemed increased in those of the aged affected with general atheroma, in hemiplegics (on the diseased side when there was secondary contracture), and in delirium of persecution. In all other cases the rate was diminished. (2) Motor conduction in the cord and nerves is quicker than normal in flaccid hemiplegia and in the presence of a disturbing noise, about normal with the epileptics, and slower with the other subjects. (3) The discrimination-time, normally 0.063—0.070 sec., is longer with a disturbing noise and for all the invalid subjects except the epileptics (with whom it is shorter), the hemiplegics with contracture when stimulated on the sound side, and the simply aged, with whom it is normal. (4) The simple reaction-time, found in the normal to be 0.1545—0.1587 sec., is shorter after taking phenacetine or antipyrine, and in old age with general atheroma, hemiplegia (on the sound side; on the diseased side likewise with contractures), and in hysteria. (5) The reaction-time is regularly shorter for strong stimuli, except sometimes with the aged, hemiplegics, epileptics